

Gregor, Margaret

From: Metz, Chloe
Sent: Friday, June 12, 2015 11:16 AM
To: Gregor, Margaret
Cc: Wilson, Eric
Subject: Site-specific cleanup value for cadmium
Attachments: Cadmium RSL.pdf

Margaret,

Early on, we talked about developing site-specific screening levels for the ball fields, assuming some sort of ball player scenario (for example, a child 0-6 would spend 2 hrs a day for 72 days per year watching an older sibling play), but in the end, we decided to go with the residential RMLs because that's what our guidance recommends and also doing an adjustment to the IEUBK model for a more intermittent exposure is somewhat unreliable. I went ahead and calculated a site-specific screening level for cadmium (attached) just so you could see what it would be compared to the RML. It is 347 ppm (based on a child receptor, set at a hazard quotient of 1). Our cadmium hits for soccer field #1 fall between the RML and the site-specific screening value, which I think gives us some comfort that there is no immediate need for a removal action. However, I would feel uncomfortable using this site-specific number for cadmium as a final cleanup number since that's not what we've done with lead on the other fields. The state's restricted residential value for cadmium is 4.3 ppm by the way.

We can discuss more on Monday, just wanted to give you this additional info in advance.

Thanks!
Chloe

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Site-specific

Recreator Equation Inputs for Soil

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Variable	Value
TR (target cancer risk) unitless	1.0E-6
SA _{recsc} (skin surface area - child) cm ² /day	2373
SA _{recsa} (skin surface area - adult) cm ² /day	6032
SA ₀₋₂ (skin surface area - mutagenic) cm ² /day	2373
SA ₂₋₆ (skin surface area - mutagenic) cm ² /day	2373
SA ₆₋₁₆ (skin surface area - mutagenic) cm ² /day	6032
SA ₁₆₋₃₀ (skin surface area - mutagenic) cm ² /day	6032
SA _{recsa} (skin surface area - adult) cm ² /day	6032
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
IFS _{rec-adj} (age-adjusted soil ingestion factor) mg/kg	11860
DFS _{rec-adj} (age-adjusted soil dermal factor) mg/kg	39425.12
IFSM _{rec-adj} (mutagenic age-adjusted soil ingestion factor) mg/kg	42920
DFSM _{rec-adj} (mutagenic age-adjusted soil dermal factor) mg/kg	124411.84
EF ₀₋₂ (exposure frequency) day/year	72
EF ₂₋₆ (exposure frequency) day/year	72
EF ₆₋₁₆ (exposure frequency) day/year	244
EF ₁₆₋₃₀ (exposure frequency) day/year	244
EF _{recsc} (exposure frequency - child) day/year	72
EF _{recsa} (exposure frequency - adult) day/year	244
EF _{recsa} (exposure frequency - adult) day/year	244
EF _{recs} (exposure frequency - recreator) day/year	204.308
IRS ₀₋₂ (soil intake rate) mg/day	200
IRS ₂₋₆ (soil intake rate) mg/day	200
IRS ₆₋₁₆ (soil intake rate) mg/day	100
IRS ₁₆₋₃₀ (soil intake rate) mg/day	100
IRS _{recsc} (soil intake rate - child) mg/day	200
IRS _{recsa} (soil intake rate - adult) mg/day	100

Site-specific

Recreator Equation Inputs for Soil

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Variable	Value
IRS_{reccs} (soil intake rate - adult) mg/day	100
ED_{0-2} (exposure duration) year	2
ED_{2-6} (exposure duration) year	4
ED_{6-16} (exposure duration) year	10
ED_{16-30} (exposure duration) year	10
ED_{reccsc} (exposure duration - child) year	6
ED_{reccsa} (exposure duration - adult) year	20
ED_{reccsa} (exposure duration - adult) year	20
ED_{reccs} (exposure duration - recreator) year	26
ET_{0-2} (exposure time) hr/day	2
ET_{2-6} (exposure time) hr/day	2
ET_{6-16} (exposure time) hr/day	2
ET_{16-30} (exposure time) hr/day	2
ET_{reccsc} (exposure time - child) hr/day	2
ET_{reccsa} (exposure time - adult) hr/day	2
ET_{reccsa} (exposure time - adult) hr/day	2
ET_{reccs} (exposure time - recreator) hr/day	2
BW_{0-2} (body weight) kg	15
BW_{2-6} (body weight) kg	15
BW_{6-16} (body weight) kg	80
BW_{16-30} (body weight) kg	80
BW_{reccsc} (body weight - child) kg	15
BW_{reccsa} (body weight - adult) kg	80
BW_{reccsa} (body weight - adult) kg	80
AF_{0-2} (skin adherence factor) mg/cm^2	0.2
AF_{2-6} (skin adherence factor) mg/cm^2	0.2
AF_{6-16} (skin adherence factor) mg/cm^2	0.07
AF_{16-30} (skin adherence factor) mg/cm^2	0.07
AF_{reccsc} (skin adherence factor - child) mg/cm^2	0.2

Site-specific

Recreator Equation Inputs for Soil

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Variable	Value
AF_{reca} (skin adherence factor - adult) mg/cm^2	0.07
AF_{reca} (skin adherence factor - adult) mg/cm^2	0.07
City (Climate Zone) PEF Selection	Default
A_{ϵ} (acres) PEF Selection	0.5
Q/C_{wp} (g/m^2 -s per kg/m^3) PEF Selection	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependant on U_m/U_t) unitless	0.194
City (Climate Zone) VF Selection	Default
A_{ϵ} (acres) VF Selection	0.5
Q/C_{wp} (g/m^2 -s per kg/m^3) VF Selection	68.18
foc (fraction organic carbon in soil) g/g	0.006
ρ_b (dry soil bulk density) g/cm^3	1.5
ρ_s (soil particle density) g/cm^3	2.65
θ_w (water-filled soil porosity) L_{water}/L_{soil}	0.15
T (exposure interval) s	819936000
A (VF Dispersion Constant)	11.911
B (VF Dispersion Constant)	18.4385
C (VF Dispersion Constant)	209.7845

Site-specific

Recreator Screening Levels (RSL) for Soil

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (ug/m ³) ⁻¹	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref	GIABS	ABS	RBA
Cadmium (Diet)	7440-43-9	No	No	-		1.80E-03	I	1.00E-03	I	1.00E-05	A	0.025	0.001	1

Chemical	Volatilization Factor (m ³ /kg)	Soil Saturation Concentration (mg/kg)	Particulate Emission Factor (m ³ /kg)	Ingestion SL TR=1.0E-6 (mg/kg)	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL Child HQ=1 (mg/kg)	Dermal SL Child HQ=1 (mg/kg)	Inhalation SL Child HQ=1 (mg/kg)
Cadmium (Diet)	-	-	1.36E+09	-	-	4.36E+04	4.36E+04	3.80E+02	4.01E+03	8.27E+05

Chemical	Noncarcinogenic SL Child HI=1 (mg/kg)	Ingestion SL Adult HQ=1 (mg/kg)	Dermal SL Adult HQ=1 (mg/kg)	Inhalation SL Adult HQ=1 (mg/kg)	Noncarcinogenic SL Adult HI=1 (mg/kg)	Screening Level (mg/kg)
Cadmium (Diet)	3.47E+02	1.20E+03	7.09E+03	2.44E+05	1.02E+03	3.47E+02 nc